

Review of the Palaearctic Genus *Paranchodemus* Habu (Coleoptera: Carabidae: Platynini)

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Abstract.—The genus *Paranchodemus* Habu, new status, is diagnosed and described. It comprises the type species, *Anchomenus calleides* Bates of Japan, and *P. davidis*, n. sp. from Szechwan Province, China. The two species are diagnosed, and the new species is described. A lectotype is designated for *P. calleides*, n. comb. Based on shared-derived characters of the tarsi and the female reproductive tract, *Paranchodemus* is phylogenetically similar to the North American genera *Rhadine* LeConte and *Tanystoma* Motschulsky. The characters forming the basis for this decision are illustrated, and discussed in relation to character-state distributions across the tribe Platynini.

In 1978, Habu monographed the Japanese Platynini, proposing placement of *Anchomenus cyaneus* Dejean of Europe and the Japanese *Anchomenus calleides* Bates in the genus *Anchodemus* Motschulsky. Because of differences in various characters, *A. calleides* was recognized as the type species of a new subgenus within *Anchodemus*—*Paranchodemus* Habu (1978:7).

In the course of revising the closely related platynine genera *Anchomenus* Bonelli, *Sericoda* Kirby, *Elliptoleus* Bates, and *Chlaeniomimus* Semenov, I have discovered synapomorphies of the female reproductive tract that necessitate placement of *A. cyaneus* in *Anchomenus*, which is based on *Carabus dorsalis* Pontopidan. Thus, *Anchodemus* should be considered a junior synonym of *Anchomenus*. *A. calleides* is recognized as type species of the distinct genus *Paranchodemus*, new status. The mainland Asian *Paranchodemus davidis*, n. sp. is recognized as a second species of *Paranchodemus*. Below, I present a diagnosis and description of *Paranchodemus*, and a description of the new species. The generic diagnosis is based on several characters judged to be synapomorphous for the genus, as well as synapomorphies of greater generality that allow placement of *Paranchodemus* in the *Rhadine-Tanystoma* lineage (Liebherr, 1986:19) of the carabid tribe Platynini, subtribe Platyni. This placement is based largely on characters of the tarsi, which are illustrated and discussed in the context of platynine carabid character evolution.

MATERIALS AND METHODS

Taxonomic material for this study was obtained through the courtesy of Nigel E. Stork, British Museum (Natural History), London (BMNH) and Helene Perrin, Museum National d'Histoire Naturelle, Paris (MNHP).

Dissection methodology follows Liebherr (1986, 1987). Scanning electron mi-

crographs were made on an Amray 1000A scanning electron microscope using gold-palladium coated specimens. The terminology for female ovipositor setation is drawn from Ball and Hilchie (1983).

***Paranchodemus* Habu, NEW STATUS**

Anchodemus (*Paranchodemus*) Habu, 1978, Fauna Japonica, Carabidae: Platynini, p. 7.

Type species. — *Anchomenus calleides* Bates.

Diagnosis. — Pronotum lacking setae at hind angles (Figs. 1, 2); mentum with bidentate median tooth (Figs. 3, 4); fourth metatarsomere without dorsal subapical setae, only ventral setae and apical setae (Figs. 7, 8, 28); seventh elytral stria with 2–4 setae near apex (Figs. 9, 10); abdominal sternites III–V with 2–4 setae each side (Figs. 11, 12); female apical gonocoxite with 9 furrow pegs in apical pit-like depression (Figs. 21, 22, 25, 26) and lacking dorsal ensiform seta (Figs. 21, 25); apical nematiform setae very short and stout (Figs. 21, 25); body dorsum with metallic blue reflection.

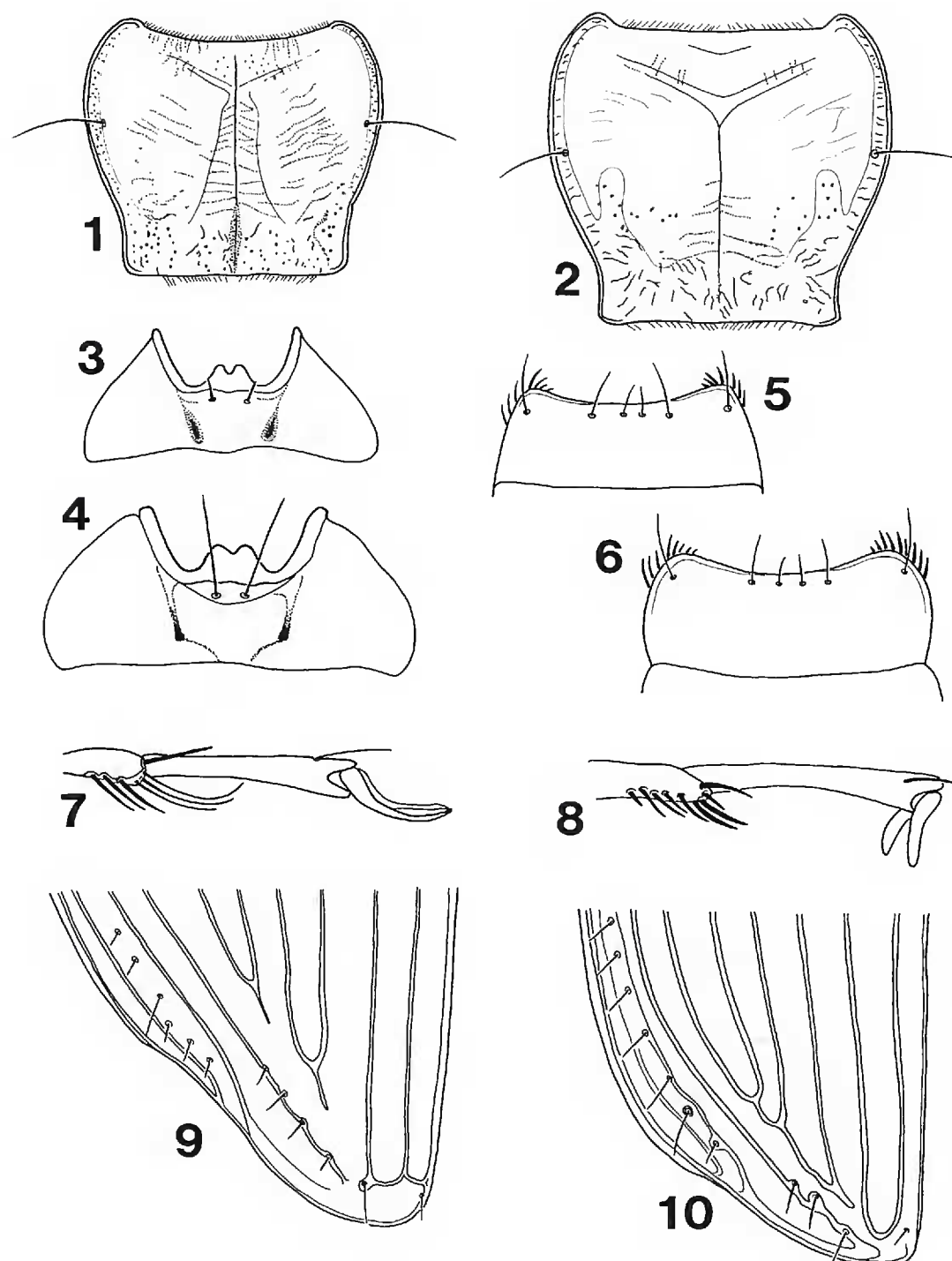
Description. — *Head:* Eyes convex, with dorsal surface convex relative to deep supraorbital groove; 2 supraorbital setae; frontal grooves broad, shallow, not reaching anterior supraorbital setae; labrum with concave anterior margin and 6 apical setae, the median 4 approximate (Figs. 5, 6); mentum with bidentate median tooth (Figs. 3, 4), with well-developed lateral pit-like depressions; antennal scape robust, third antennomere elongate, subequal in length to scape plus pedicel; microsculpture well developed, vertex either with rugose wrinkles (*P. calleides*) or rugose punctulae (*P. davidis*).

Prothorax: Pronotum cordate, lateral margins broadly arcuate anteriorly and sinuate in posterior third, hind angles glabrous (Figs. 1, 2); lateral margin narrow throughout, lateral depression crenulate to punctate; laterobasal depressions heavily rugose, the surface both wrinkled and punctate; basal marginal bead absent except near hind angles; median longitudinal depression deep, joined by transverse wrinkles at least basally; anterior transverse impressions shallow; anterior marginal bead absent, anterior angles slightly projecting; prosternal projection broadly rounded to slightly acuminate apically in ventral view, not carinate.

Elytra: Basal groove broadly rounded on humeri, lateral marginal depression narrow throughout; subapical sinuation well developed; sutural apex evenly rounded (*P. calleides*, Fig. 9) to obtuse-rounded (*P. davidis*, Fig. 10); elytral intervals broadly rounded, moderately convex; striae deep, well developed; scutellar seta present at base of sutural stria; 3 or 4 dorsal setae associated with third interval, the anterior seta in third stria, the more posterior setae in second stria; 2–4 setae in apical portion of seventh stria (Figs. 9, 10); a single seta near apex of sutural (or first) interval; 17–27 setae set laterad eighth stria from humerus to subapical sinuation; internal elytral plica obsolete; elytral intervals with strong isodiametric microsculpture.

Pterothorax: Metepisternum elongate; flight wings fully developed, venation complete.

Legs: Femora elongate, slender; mesocoxae with single seta on ventrolateral ridge, mesofemora with 2 setae on anteroventral margin, occasionally the inner seta doubled; metacoxae bisetose, one seta near anterior margin at base of lateral

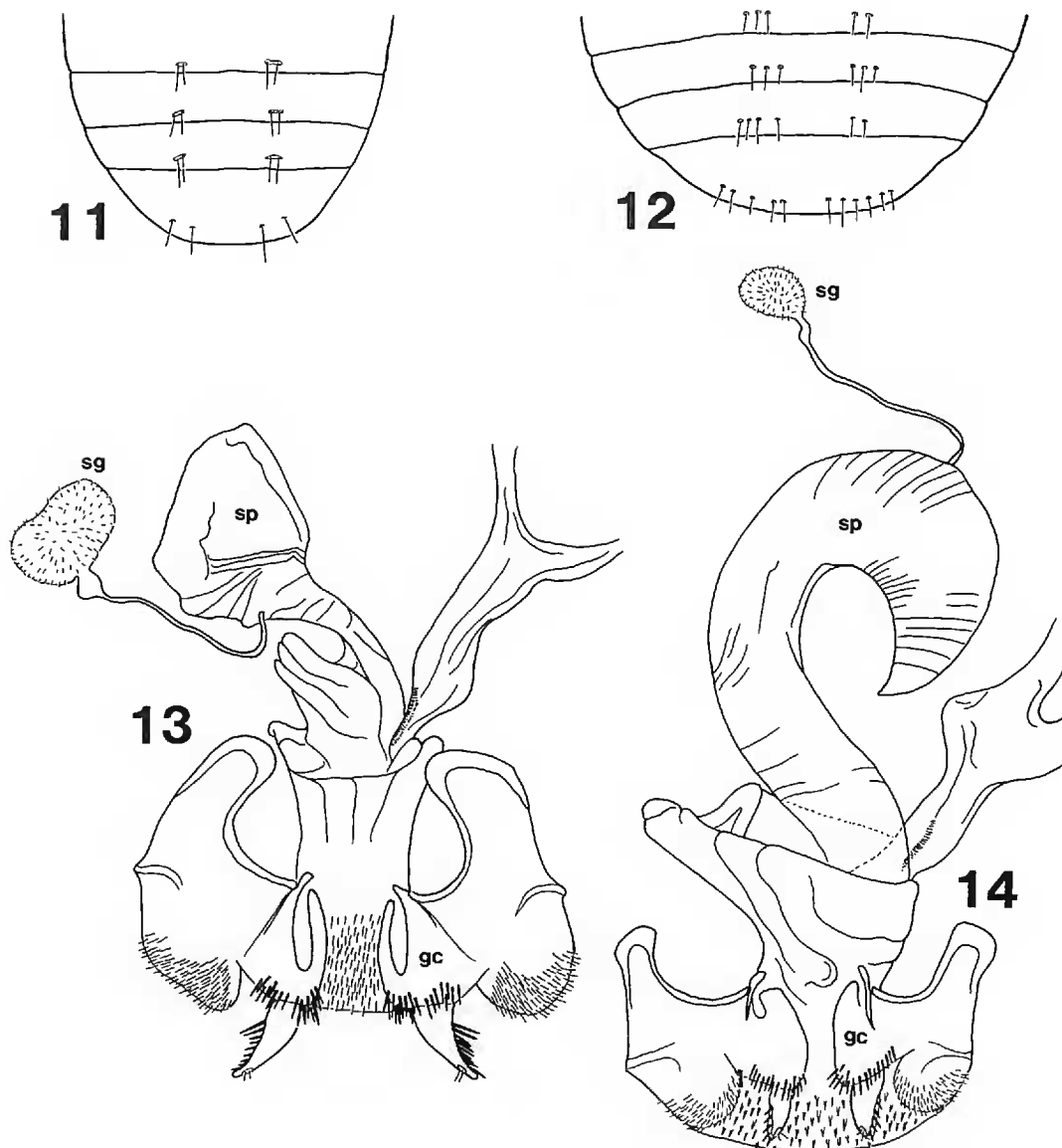


Figures 1–10. 1, 3, 5, 7, 9. *Paranchodemus calleides*. 2, 4, 6, 8, 10. *Paranchodemus davidis*, n. sp. 1, 2. Pronotum, dorsal view. 3, 4. Mentum, ventral view. 5, 6. Labrum, dorsal view. 7, 8. Fourth and fifth left metatarsomere, outer view. 9, 10. Apex of left elytron.

expansion, the other ventrad coxal-trochanteral articulation; protarsi with fourth tarsomere emarginate apically with two subequal lobes, lobes about $0.50\times$ as long as basal portion in females, $0.70\text{--}0.85\times$ as long as basal portion in males; well-developed dorsolateral sulci on basal 3 tarsomeres of meso- and metatarsi (Fig. 27), the inner sulcus somewhat weaker; the fourth meso- and metatarsomere emarginate apically, bearing apical setae but lacking subapical setae (Figs. 7, 8, 28); tarsal claws slender, arcuate; apical tarsomere appearing glabrous ventrally, the ventral setae extremely short (visible at $125\times$).

Male genitalia: Parameres glabrous, right or ventral paramere smaller to much smaller than left paramere (Figs. 16, 18); parameres basally melanistic; median shaft of aedeagus melanistic, wrinkled basally (Figs. 15, 17); aedeagal internal sac with very fine spicules; sac as long as apical straight portion of median lobe.

Female reproductive tract: Spermatheca broadly joined to common oviduct at



Figures 11–14. 11, 13. *Paranchodemus calleides*. 12, 14. *Paranchodemus davidis*, n. sp. 11, 12. Female abdominal sternites III–VI, ventral view. 13, 14. Female reproductive tract, ventral view. sg = Spermathecal gland; sp = spermatheca; gc = basal gonocoxite.

bursa copulatrix (Figs. 13, 14); spermathecal gland duct entering directly into reservoir; basal gonocoxite with apical fringe of 15–23 setae (Figs. 13, 14, 19, 23); apical gonocoxite bearing 3–7 lateral ensiform setae, lacking a dorsal ensiform seta; apical pit-like depression of apical gonocoxite containing 2 nematiform setae, and 9 furrow pegs (Figs. 22, 26).

Color: Dorsum of head, pronotum, and elytra piceous with metallic blue reflection; ventral body surface, antennae, palps, and legs piceous to brunneous.

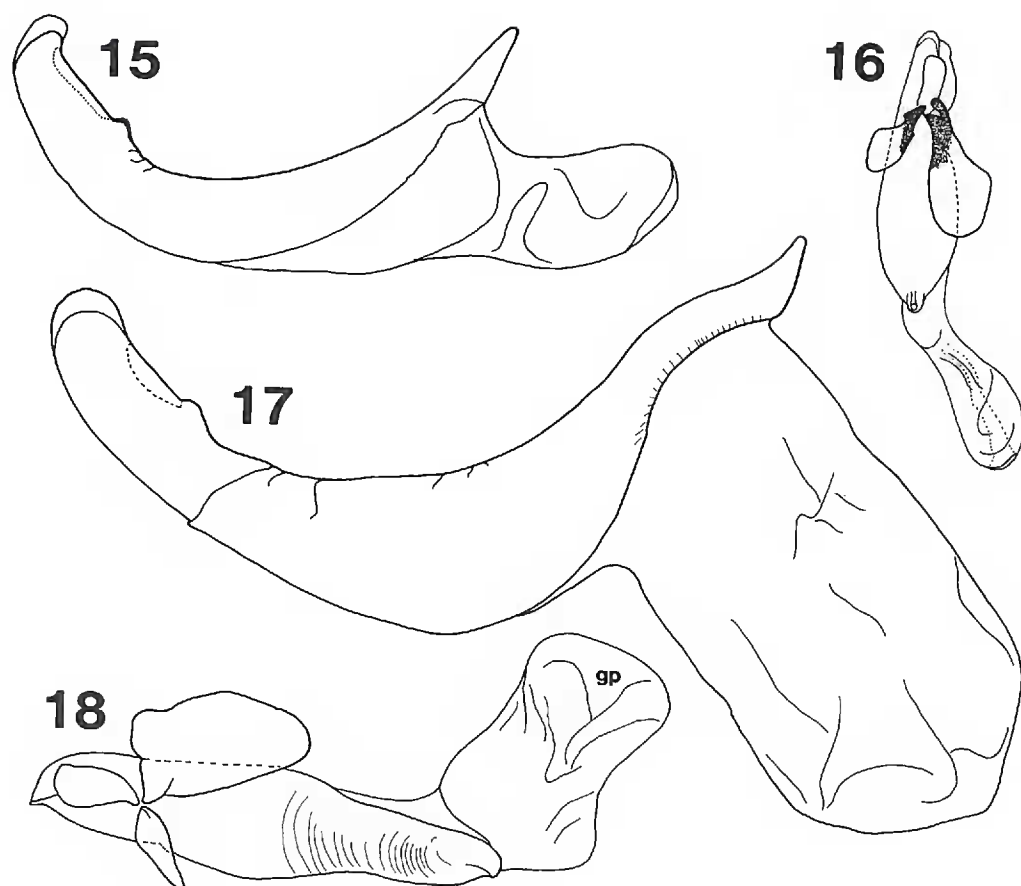
Length: 10.8–13.3 mm.

***Paranchodemus calleides* (Bates), NEW COMBINATION**

Anchomenus calleides Bates, 1883, Trans. Entomol. Soc. London, p. 256.

Diagnostic combination. — Dorsal body surface piceous with metallic blue-green reflection; mentum with shallow uniformly sloped mentum pits (Fig. 3); pronotal disc with strong transverse wrinkles throughout (Fig. 1); elytral striae on disc with distinct punctulae; seventh stria with 3–5 (usually 4) setae near apex in addition to single seta near apex of second stria (Fig. 9); visible abdominal sternites III–V with 2, rarely 3, closely set setae each side (Fig. 11); abdominal sternite VI with one seta each side in male, two setae each side in female.

Male genitalia: Parameres basally melanistic, the smaller ventral or right par-



Figures 15–18. 15, 16. *Paranchodemus calleides*. 17, 18. *Paranchodemus davidis*, n. sp. 15, 17. Median lobe of aedeagus with internal sac everted, dextroventral view. 16, 18. Aedeagal median lobe with internal sac everted and parameres, anterior view, $\frac{2}{3}$ scale of 15 and 17. gp = Gonopore.

amere rounded apically (Fig. 16); shaft of aedeagal median lobe evenly curved, apex rounded-acuminate (Fig. 15); aedeagal internal sac covered with very weakly developed spicules.

Female reproductive tract: Spermatheca apically expanded, globose (Fig. 13); basal gonocoxite with apical fringe of 17–23 setae on ventral surface (Figs. 13, 19, 20); apical gonocoxite with 2 long acuminate setae basally on lateral margin (Figs. 13, 19, 20) and 5–7 shorter blunt setae apically and more dorsally on lateral margin (Fig. 21).

Length: 10.8–11.7 mm.

Lectotype. —♀ (BMNH); [card mounted]; Morioka; Japan, G. Lewis, 1910 - 320; Syn-type [blue bordered label]; Lectotype, *Anchomenus calleides* Bates, J. K. Liebherr, 1988.

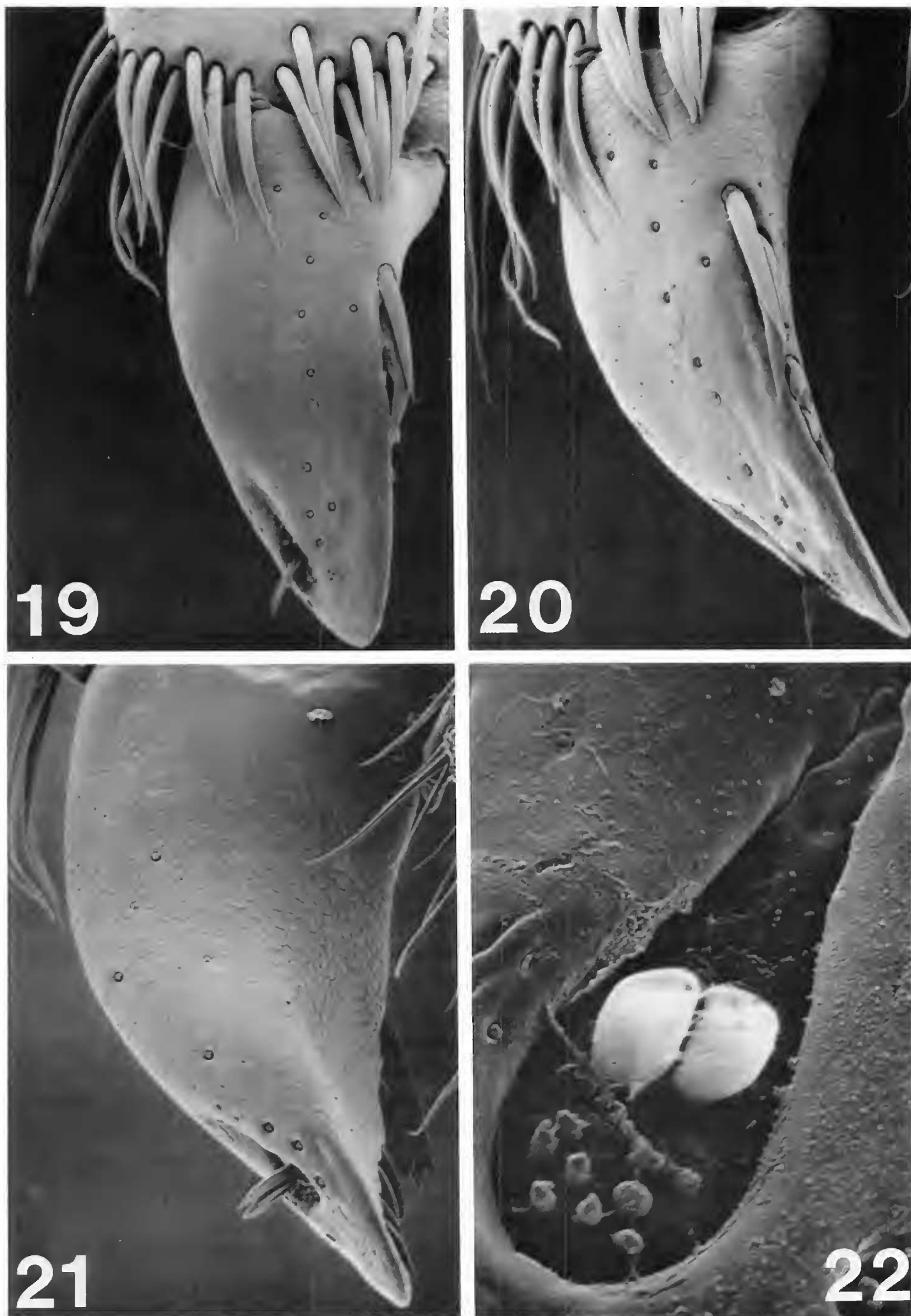
Distribution. —Bates (1883) described *P. calleides* from a type series comprised of specimens from Morioka and Midzusawa, Japan. Habu (1978) reports it to be generally distributed on the island of Honshu.

Notes. —Habu (1978:7–9) provides a complete synonymy and detailed description of this species. He incorrectly describes the apical gonocoxite as laterally bisetose, apparently missing the more apical lateral ensiform setae found dorsad the lateral margin (Figs. 20, 21).

Habitat. —Reported from “under stones in the Kitakamigawa (Bates, 1883).” Habu (1978) states that it lives on river beds.

Paranchodemus davidis, NEW SPECIES

Diagnostic combination. —Body dorsum brilliant metallic blue to blue-green; lateral depressions of mentum with deep narrowly rounded pit (Fig. 4); strong



Figures 19–22. *Paranchodemus calleides*, ♀. 19. Left gonocoxa, ventral view, 239 \times . 20. Left gonocoxa, outer lateral view, 272 \times . 21. Right gonocoxa, dorsal view, 312 \times . 22. Apical pit-like depression with 2 nematiform setae and 9 furrow pegs, 2047 \times .

transverse wrinkles intersecting median longitudinal depression of pronotum, but discal areas more laterad with at most weak transverse wrinkles (Fig. 2); elytral striae slightly wavering, but lacking distinct regular punctulae; seventh stria with 2–3 setae near apex, lacking seta near apex of second stria (Fig. 10); visible abdominal sternites III–V with 2–4 setae in a row near posterior margin each side; abdominal sternite VI with 1–2 setae each side in male, 2–6 setae each side in female (Fig. 12).

Description. — *Head:* Eyes convex, margined mesad by well-defined supraorbital depression, supraorbital setae separated from supraorbital depression by $1.5 \times$ the distance of depression from margin of eye; frontal depressions broad, somewhat irregular, continuous to setae at anterior angles of clypeus; apical margin of clypeus strongly concave (Fig. 6); clypeus and mandibles brunneous, maxillae and palps redder; mentum with deep pit in deepest portion of lateral depression (Fig. 4); diameter of antennal scape $1.33 \times$ the diameter of pedicel apex; third antennomere $1.30\text{--}1.45 \times$ length of scape and $1.10 \times$ length fourth antennomere; basal 5 antennomeres piceous, apical 6 segments rufopiceous; neck constricted, depressed on dorsum, the depression densely punctate; microsculpture on vertex weak, an isodiametric to slightly stretched isodiametric mesh; vertex of head with green to blue reflection, punctate area of neck with blue to purple reflection.

Prothorax: Pronotum narrow, greatest width $1.10 \times$ width across eyes; lateral depression narrow in apical half; single lateral seta situated $\frac{4}{7}$ length anterad hind angle; hind angles sharply obtuse, distinctly margined; laterobasal depression with dense rugose wrinkles; mediobasal elevated region rugosely wrinkled; median longitudinal depression deep, finely engraved, broader and more irregular basally; strong transverse wrinkles intersecting base of longitudinal depression, transverse wrinkles weaker forward near anterior transverse depressions and on elevated portions of disc; anterior transverse depressions strongly bordered anteriorly, traversed by longitudinal wrinkles toward apex near front angles; front angles rounded, slightly projecting; proepisternum punctate ventrally; prosternal projection broadly rounded apically; discal pronotal microsculpture a transverse mesh; disc of pronotum with metallic green to blue reflection, anterior and posterior margins and sternum piceous to rufopiceous.

Elytra: Humeri broadly rounded; elytra widest just behind middle; basal margin weakly recurved, slightly irregular near bases of striae; scutellar striole long, about $\frac{2}{3}$ length distance of anterior dorsal elytral seta from base of third stria; lateral margin of elytra narrow, subapical sinuation evident (Fig. 10); elytral striae complete, well impressed, slightly wavering but smooth, not punctate; elytral intervals only slightly convex, outer intervals flat medially; 3 (or less commonly 4) dorsal elytral setae, anterior seta in third stria, posterior setae in second stria; apex of seventh stria with 2–3 setae, single seta near apex of sutural interval (Fig. 10); 16–21 setae laterad eighth elytral interval before subapical sinuation; elytral microsculpture a strong isodiametric mesh; elytral margins and sutural intervals with strong green to blue metallic reflection, elytral epipleura brunneous.

Legs: Mesofemora with 3 setae along anteroventral margin, 4 if the inner seta is doubled (3 specimens of 7); metafemora bisetose anteroventrally; protarsi of female with bisulcate first tarsomere; second tarsomere with weak dorsolateral sulci, median area longitudinally strigose; third tarsomere triangular, with weak median carina, slightly emarginate apically; fourth tarsomere emarginate apically,

lobate; protarsi of male with basal tarsomeres $1.6\times$ as wide apically as in female, more apical tarsomeres only slightly wider; basal 3 tarsomeres strigose dorsally, with weak median carina; fourth tarsomere strongly emarginate apically, lobes $0.70\text{--}0.85\times$ as long as basal portion of tarsomere; basal 3 tarsomeres of meso- and metalegs with 2 well-developed dorsolateral sulci (Fig. 27); fourth metatarsomere with broader and slightly longer outer lobe, and a narrower inner lobe bearing an apical seta (Fig. 28).

Male genitalia: Parameres melanistic; right or ventral paramere very small relative to spatulate left paramere (Fig. 18); aedeagal median lobe recurved near apex, short and upturned (Fig. 17); surface of median lobe inside curve melanistic, wrinkled; internal sac globose, with stronger spicules near apex, gonopore opening on left side (Fig. 18).

Female reproductive tract: Spermatheca broad and hook-shaped, with acuminate apex (Fig. 14); basal gonocoxite with apical fringe of 15–20 setae on ventral surface (Figs. 14, 23); apical gonocoxite with 3–6 ensiform lateral setae set in groove along lateral margin (Figs. 14, 24); dorsal ensiform seta lacking (Fig. 25); apical depression with 9 furrow pegs (Fig. 26); apical nematiform setae short and stout (Figs. 25, 26).

Length: 11.7–13.3 mm.

Holotype. — δ ; Mou-pin [Mu-Ping, Szechwan, China, $30^{\circ}30'N$, $102^{\circ}40'E$, 1825 m elev.], A. David 1870, Museum Paris (NMHP).

Allotype. — φ ; same locality and deposition.

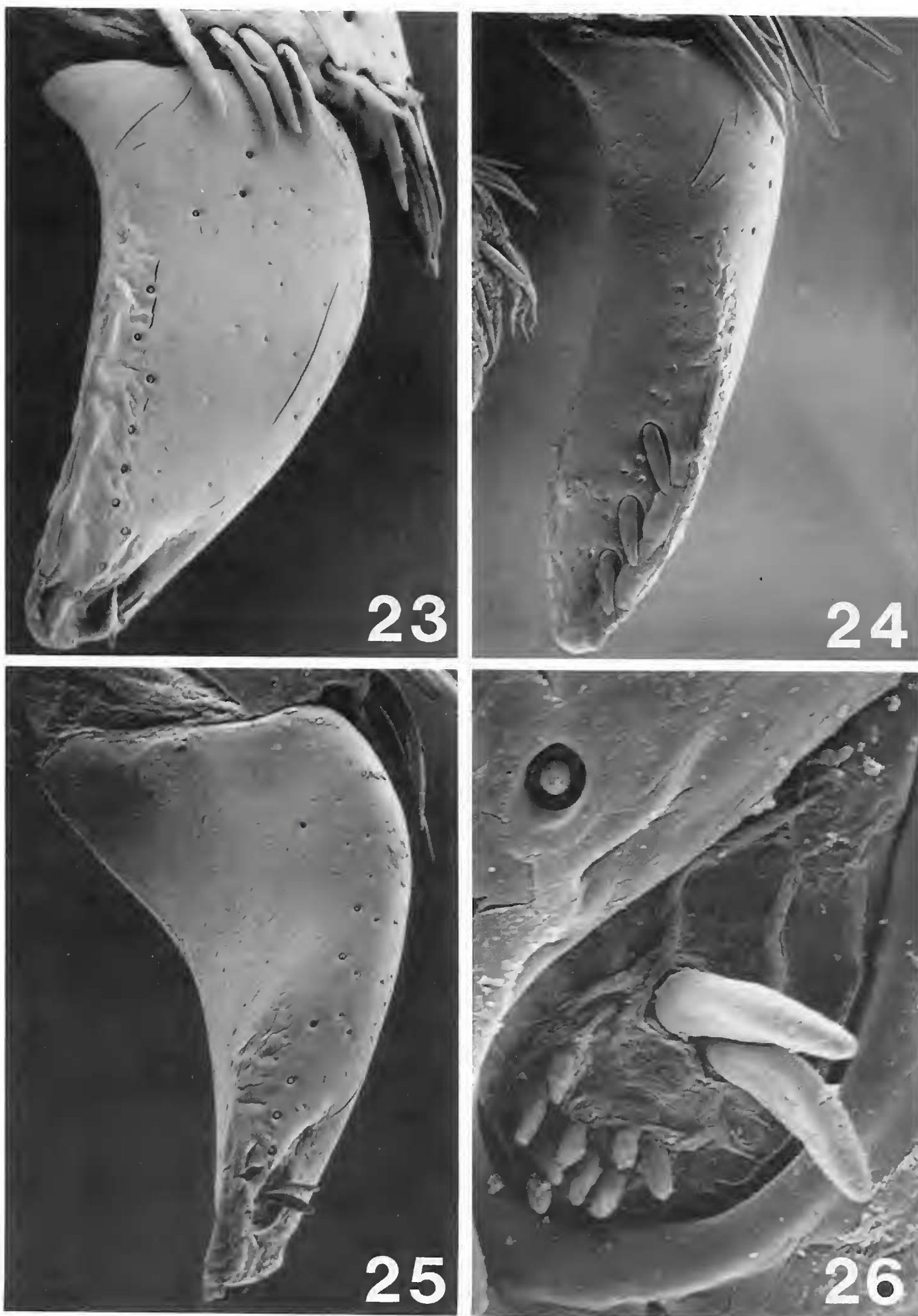
Paratypes. —Mou-pin, A. David, 1870, Museum Paris (2 δ , 1 φ , MNHP); Thibet, Chasseurs de Ta-tsien-lou [Kangting, Szechwan, China, $30^{\circ}10'N$, $102^{\circ}5'E$, 2600 m elev.], 1895 (1 δ , 1 φ , MNHP).

Notes. —The type series was found in the main collection of the Paris museum and bears a hand-written determination of "*Anchomenus davidis*." This combination has never been published, and I have exhaustively searched the literature and have found no description of a Chinese platynine carabid that fits this species. *P. davidis* appears superficially similar to the European *Anchomenus cyaneus* Dejean, but setational, tarsal, and reproductive tract characters indicate its true affinities.

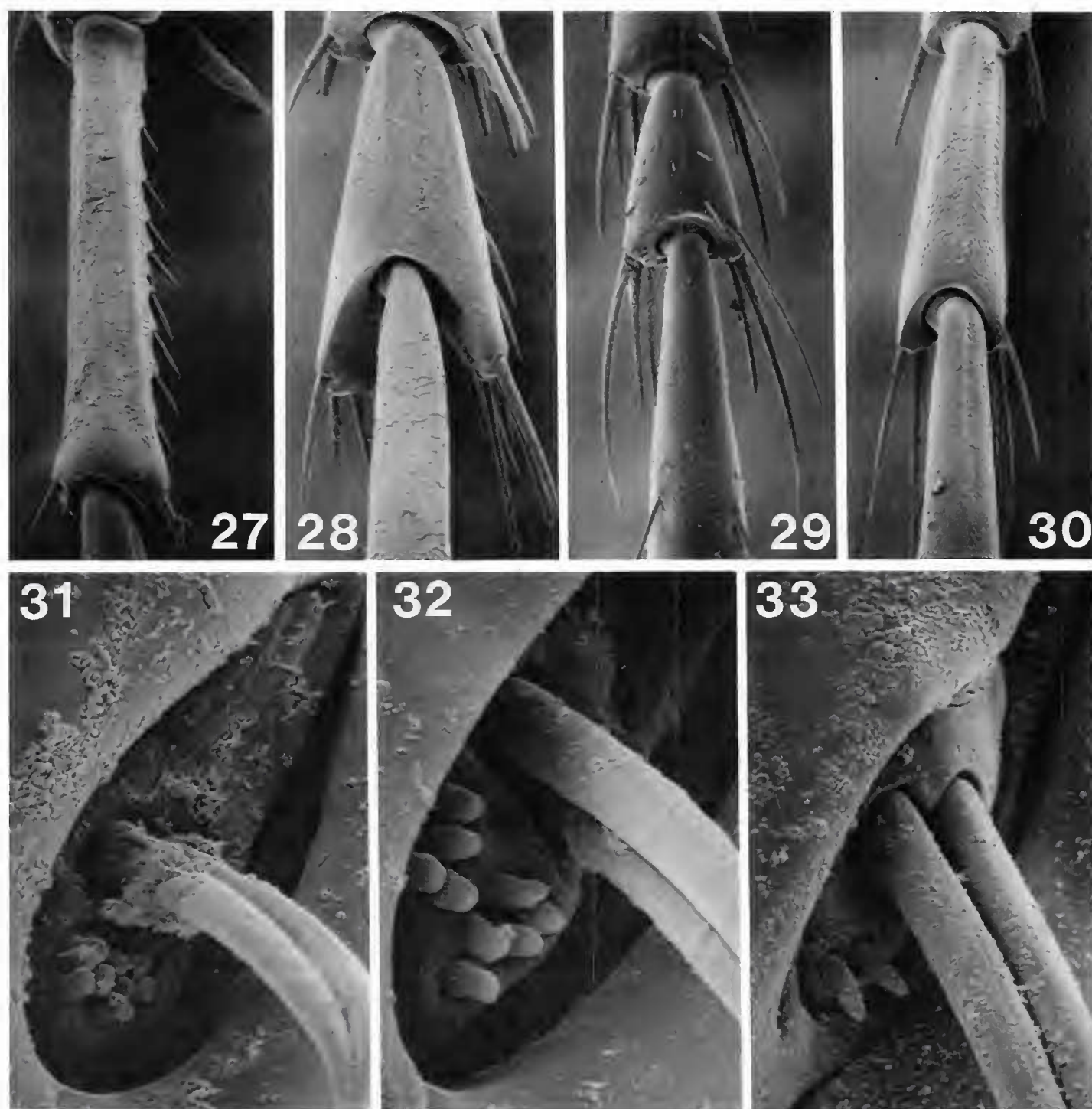
Habitat. —The valleys around Mu-Ping and Kangting are extremely deep with steep walls and high-gradient rivers at the bottoms. Based on the habits of *P. calleides* in Japan, *P. davidis* is likely to be found along rivers on bare sandy or muddy shoreline habitats, where it would hide under stones by day.

PHYLOGENETIC AFFINITIES OF *PARANCHODEMUS*

Placement of *Paranchodemus* within the tribe Platynini subtribe Platyni can be accomplished using synapomorphies of the female reproductive tract and tarsal configuration. The broad duct of the spermatheca observed in *Paranchodemus* (Figs. 13, 14) is one basis for recognition of the *Rhadine-Tanystoma* lineage, which includes the North American genera *Rhadine* LeConte, *Tanystoma* Motschulsky, *Atranus* LeConte, and *Anchus* LeConte (Liebherr, 1986). The entry of the spermathecal duct into the spermathecal reservoir is shared by *Paranchodemus* and *Anchus*. Based on spermathecal configuration, *Paranchodemus* is not closely allied to *Anchomenus*. *Anchomenus*, *Sericoda*, and *Elliptoleus* possess a sper-



Figures 23–26. *Paranchodemus davidis*, n. sp., ♀. 23. Right gonocoxa, ventral view, 239 \times . 24. Right gonocoxa, outer lateral view, 202 \times . 25. Left gonocoxa, dorsal view, 232 \times . 26. Apical pit-like depression with 2 nematiform setae and 9 furrow pegs, 1827 \times .



Figures 27–33. 27, 28. *Paranchodemus davidis*, n. sp. 27. Left basal metatarsomere, dorsal view, 52 \times . 28. Left fourth metatarsomere, dorsal view, 72 \times . 29. *Tanystoma maculicolle*, left fourth metatarsomere, dorsal view, 73 \times . 30. *Rhadine caudata*, left fourth metatarsomere, dorsal view, 61 \times . 31–33. Apical pit-like depression of female gonocoxite. 31. *Tanystoma striata*, 1662 \times . 32. *Tanystoma maculicolle*, 2532 \times . 33. *Rhadine caudata*, 1194 \times .

matheca with a long apical filament that is at least several times longer than the basal reservoir.

The fourth metatarsomere of *Paranchodemus* species lacks subapical setae (Fig. 28), a character documented across the Platynini by Habu (1978). Subapical setae are situated on the dorsoapical margin of the fourth metatarsomere, and are nearly as long as the apical setae found at the ends of the tarsal lobes. Subapical setae occur in many other Platynini (e.g., species of *Calathus*, *Olisthopus*, *Anchomenus*, most *Agonum*, and some *Platynus*). *Paranchodemus* shares the derived absence of subapical setae with *Tanystoma* (Fig. 29), which possesses only short irregularly spaced setae on the dorsum of all tarsomeres, and *Rhadine* (Fig. 30). *Anchus* and *Atranus* species possess subapical setae. This suggests a closer relationship of

Paranchodemus to *Rhadine* and *Tanystoma* than to the other taxa of the *Rhadine-Tanystoma* lineage (Liebherr, 1986).

The subtribe Platyni is characterized, among various characters, by gonocoxae with an apical pit-like depression, in which two long thin nematiform setae and a variable number of furrow pegs can be found. The number of furrow pegs has been surveyed in a variety of taxa of the Platynini, and only in the two *Paranchodemus* species, and in *Tanystoma striata* Dejean and *T. maculicollis* Dejean have as many as nine furrow pegs been observed (Figs. 22, 26, 31, 32). *Rhadine caudata* LeConte possesses only two furrow pegs (Fig. 33), the lowest number observed. Other *Tanystoma* species and most other platynine taxa exhibit three to six furrow pegs. The shared possession of the larger number of furrow pegs by *Paranchodemus* and some *Tanystoma* may indicate phylogenetic affinity. By this interpretation, furrow peg number conflicts with the sister-group relationship for *Rhadine* and *Tanystoma* proposed by Liebherr (1985). A comprehensive cladistic analysis including all known taxa sharing the above derived characters will be necessary in order to determine the relationships among these groups.

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